

$^{180}\text{Hf}(^{238}\text{U},\text{X}\gamma)$  2000Wh04

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 126, 151 (2015)	1-Feb-2015

$E(^{238}\text{U})=1.6$  GeV, beam chopped at 8.25/16.5  $\mu\text{s}$  and 2/4 ms on/off cycles. Measured  $E\gamma$ ,  $I\gamma$ ,  $\gamma\gamma$ ,  $\gamma$ -x-ray and  $\gamma$ -t coincidences using Gammasphere array consisting of 98 HPGe and 3 x-ray detectors, all with Compton-suppression.

 $^{180}\text{Ta}$  Levels

E(level) <sup>†</sup>	$J^{\pi\ddagger}$	$T_{1/2}$	Comments
77.1	9 <sup>-</sup>		
280.0	10 <sup>-</sup>		
505.4	11 <sup>-</sup>		
752.3	12 <sup>-</sup>		
1020.9	13 <sup>-</sup>		
1309.7	14 <sup>-</sup>		
1452.5	15 <sup>-</sup>		
1792.4	16 <sup>-</sup>		
2157.8	17 <sup>-</sup>		
2589.2	18 <sup>(+)</sup>		
2901.0	19 <sup>-</sup>		
3310.5	20 <sup>-</sup>		
3680.3 <sup>#</sup>	(22 <sup>-</sup> )	2.0 $\mu\text{s}$ 5	$T_{1/2}$ : from comparison of 492 $\gamma$ and 370 $\gamma$ intensities in 365 $\gamma$ gated spectrum. $J^{\pi}$ : (E2) 370 $\gamma$ to 20 <sup>-</sup> . configuration= $\nu 7/2[503]\nu 7/2[514]\nu 9/2[624]$ $\pi 5/2[402]\pi 7/2[404]\pi 9/2[514]$ .
4172.3			
4172.3+x <sup>#</sup>	(23,24,25)	17 $\mu\text{s}$ 5	$T_{1/2}$ : from $\gamma\gamma(t)$ . $J^{\pi}$ : 492 $\gamma$ or 492 $\gamma$ -x $\gamma$ cascade to (22 <sup>-</sup> ). E(level): possibly same level as 4172.3-keV level. $J^{\pi}$ : proposed configuration of $\nu 7/2[514]\nu 9/2[624]\nu 11/2[615]$ $\pi 5/2[402]\pi 7/2[404]\pi 9/2[514]$ would suggest $J^{\pi}=24^{+}$ .

<sup>†</sup> From least-squares fit to  $E\gamma$  by the evaluator. The energy of the 77.1-keV isomeric level is taken from the Adopted Levels.

<sup>‡</sup> From the Adopted Levels, except where noted.

<sup>#</sup> Proposed as the six quasiparticle isomers predicted in 1998Dr07 and 1999Sa59.

 $\gamma(^{180}\text{Ta})$ 

$E_{\gamma}$	$E_i(\text{level})$	$J_i^{\pi}$	$E_f$	$J_f^{\pi}$	Mult.	Comments
x	4172.3+x	(23,24,25)	4172.3			$E_{\gamma}$ : x<60.
143.0	1452.5	15 <sup>-</sup>	1309.7	14 <sup>-</sup>		
202.7	280.0	10 <sup>-</sup>	77.1	9 <sup>-</sup>		
225.1	505.4	11 <sup>-</sup>	280.0	10 <sup>-</sup>		
246.9	752.3	12 <sup>-</sup>	505.4	11 <sup>-</sup>		
268.3	1020.9	13 <sup>-</sup>	752.3	12 <sup>-</sup>		
288.8	1309.7	14 <sup>-</sup>	1020.9	13 <sup>-</sup>		
311.8	2901.0	19 <sup>-</sup>	2589.2	18 <sup>(+)</sup>		
339.8	1792.4	16 <sup>-</sup>	1452.5	15 <sup>-</sup>		
365.2	2157.8	17 <sup>-</sup>	1792.4	16 <sup>-</sup>		
369.8	3680.3	(22 <sup>-</sup> )	3310.5	20 <sup>-</sup>	(E2)	$\alpha(\text{exp})=0.09$ 8 from intensity balance. Mult.: E2 or E3 from $\alpha(\text{exp})$ ; E3 excluded by comparison to RUL.
409.5	3310.5	20 <sup>-</sup>	2901.0	19 <sup>-</sup>		
428.5	505.4	11 <sup>-</sup>	77.1	9 <sup>-</sup>		
431.3	2589.2	18 <sup>(+)</sup>	2157.8	17 <sup>-</sup>		

Continued on next page (footnotes at end of table)

$^{180}\text{Hf}(^{238}\text{U},\text{X}\gamma)$  2000Wh04 (continued) $\gamma(^{180}\text{Ta})$  (continued)

$E_\gamma$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.	Comments
431.5	1452.5	15 <sup>-</sup>	1020.9	13 <sup>-</sup>		
472.3	752.3	12 <sup>-</sup>	280.0	10 <sup>-</sup>		
492.0	4172.3		3680.3	(22 <sup>-</sup> )		
515.5	1020.9	13 <sup>-</sup>	505.4	11 <sup>-</sup>		
557.6	1309.7	14 <sup>-</sup>	752.3	12 <sup>-</sup>		
705	2157.8	17 <sup>-</sup>	1452.5	15 <sup>-</sup>		
1136.8	2589.2	18 <sup>(+)</sup>	1452.5	15 <sup>-</sup>	[E3]	$I_\gamma: I_\gamma(1137\gamma)/I_\gamma(431\gamma)\approx 7\%$ .

$^{180}\text{Hf}(^{238}\text{U}, X, \gamma)$  2000Wh04

## Level Scheme

